still holds to his former view concerning the motor mechanisms of Mimosa, in spite of the doubt cast upon his theory by the work of MACDOUGAL and FITTING.

The noteworthy changes that are to be found in this third edition make it necessary for all libraries. Many among us may not accept the teleological views that are to be found throughout the work, and it may occasion disappointment to find at several points, as stated above, that the author maintains his own unstable theories in the face of what will appeal to most botanists as conclusive proof against them. In particular, it is highly doubtful if we may longer believe in the condensing power of the aerial roots of orchids, conduction by the shortest route as explaining the elongation of palisade cells, the conductive function of latex tubes, the secretive rather than storage function of aleurone, or the hydrostatic propagation of stimuli in Mimosa.

The teleological views of the author are apparently not merely conveniences of expression, but purpose in plant structures appears to be regarded as an objective reality, which operates as a cause in the development of plant organs and tissues. As a consequence, it may not be surprising that the author is almost violent in his opposition to the contributions of such men as DEVAUX, SPANJER, and WIELER, and gives no place at all or at most inadequate consideration to the work of such men as GRIFFON, BERNARD, and FRIEDEL. The trend of modern investigation is certainly away from the idea that purpose is the directive factor in the evolution of structures, as well as from the idea that all structures must have a definite and advantageous function. However, the vast majority of structures are certainly useful, and the study of function in relation to structure gives life and vitality to what is otherwise a dead and profitless study to most students. And for this reason HABERLANDT'S work fills a place that is taken by no other work. For this reason, too, it is much to be hoped that there will soon be available a translation of this third edition.—H. C. COWLES.

Smoke and vegetation.

THERE have been a number of treatises dealing with the injurious effects of smoke on vegetation, but we are now favored with a monographic treatment of the subject by HASELHOFF and LINDAU.[3] There are first some general considerations on the origin of smoke, the characteristics and extent of its injuries to plants, the various causes of the formation of leaf spot, and the comparison of normal plant characteristics with injuries due to smoke. The body of the work deals with the injurious smokes and vapors in detail. Particular attention is paid to the effect of sulfurous and sulfuric acid vapors. Injurious effects are found to be associated chiefly with the foliage organs; little or no harm comes to the plant through vapors which may have been absorbed by the soil. Harmful effects are made evident through the formation of leaf spots, the death of leaves and young branches, the disorganization of chloroplasts, plasmolysis,

[3] HASELHOFF, E., and LINDAU, G., Die Beschädigung der Vegetation durch Rauch: Handbuch zur Erkennung und Beurteilung von Rauchschäden. Imp. 8vo. pp. viii+412. *figs.* 27. Berlin: Gebrüder Borntraeger. 1903. *M*10.

an increase of tannin deposits, and a reduction in the annual ring. An important point is that the stomata play no particular part in the absorption of the injurious vapors; the whole leaf appears to be involved in the process.

Plants vary widely in their power of resistance to noxious vapors; this might be anticipated in the case of different plant species, but it is strongly true as well among different individuals of the same species. Harmful effects are accelerated when there is an increase of light, heat or drouth, and as might be supposed therefrom, one of the first signs of injury is a drying out of the leaf, due to an impeded circulation of water. In a similar manner, though much less fully, the injurious influences of other smokes and vapors are discussed, *e. g.*, chlorin, hydrochloric acid, hydrofluoric acid, nitric acid, acetic acid, ammonia, hydrogen sulfid, bromin, tar, pyridin, phenol, fog, asphalt, illuminating gas, and dust. It will be seen from the list of subjects treated that the monograph considers all atmospheric elements apart from those which are commonly regarded as normal, whether or not they may be classed under the head of smokes or vapors. The book abounds in examples that have been taken from a wide field experience. For this and other reasons, the work will prove of great value to foresters, and to all who cultivate plants in the vicinity of cities or factories. And the botanist also will find here for the first time, perhaps, the injurious effects of smokes and vapors presented in such a way as to permit of ready reference.—H. C. COWLES.

Classification of flowering plants.[4]

MR. A. B. RENDLE has undertaken to present to the somewhat advanced student "a systematic account of the flowering plants," and the first volume, now before us, comprises the gymnosperms and monocotyledons. It may be said that the emphasis is laid upon classification, as the title would imply, rather than upon morphology. The essential morphology of the great groups is outlined briefly, but systematically and clearly, the modern point of view and terminology largely dominating, although it did not seem possible for the author to eliminate sexual terms entirely from the terminology of sporophytic structures.

The author regrets that "the means available did not allow of the preparation of large figures," for this feature of the book is out of all proportion to the value of the text. However, he has done remarkably well with the limitations that were set for him.

One of the most interesting chapters in the book is the first one, dealing with the evolution of plant classification. The subject is one which the author's experience has peculiarly fitted him to treat, and this chapter is one of the best compact presentations of it for the general student that we have seen.

Naturally the large usefulness of the book is in its full account of the plant groups, in which there is brought together a mass of information that will be of

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[4] RENDLE, ALFRED BARTON, The classification of flowering plants. Vol. I. Gymnosperms and Monocotyledons. 8vo. pp. xiv + 403. Cambridge Biological Series. Cambridge: The University Press. 1904. $3.50.